

AMENDMENTS TO THE CLAIMS

1. (Withdrawn) A system for integrated modeling, simulation and analysis of a biological system that includes processes that may be described by chemical reactions, the system comprising:

a modeling component for constructing a model of the biological system;

a simulation engine in communication with said modeling component, said simulation engine accepting as input the constructed model of the biological system and generating dynamic behavior of the constructed model as output; and

an analysis environment in communication with said simulation engine and said modeling component, said analysis environment for analyzing aspects of the constructed model.

2. (Withdrawn) the system of claim 1 wherein the modeling component comprises an environment for construction of a block diagram model of the biological system.

3. (Withdrawn) The system of claim 2 wherein the modeling component further includes at least one block identifying a set of related chemical reactions.

4. (Withdrawn) The system of claim 1 wherein the modeling component accepts user commands and input for constructing the model of the biological system.

5. (Withdrawn) The system of claim 1 wherein said simulation engine generates the dynamic behavior of the constructed model using a stochastic computational model.

6. (Withdrawn) The system of claim 1 wherein said simulation engine generates the dynamic behavior of the constructed model using a discrete time-based computational model.

7. (Withdrawn) The system of claim 1 wherein said simulation engine generates the dynamic behavior of the constructed model using a continuous time-based computational model.

8. (Currently Amended) A method for integrated modeling[[,]] and simulation ~~and analysis~~ of a biological process comprising a plurality of chemical reactions, the method comprising the steps of:

(a) constructing a model of a the biological process, wherein said model is manipulable by programming language instructions;

(b) generating, using the constructed model of the biological process, dynamic behavior of the modeled biological process; and

(c) displaying the dynamic behavior on a display device.

9. (Original) The method of claim 8 wherein step (a) comprises constructing a block diagram model of a chemical reaction that is part of the biological process.

10. (Original) The method of claim 9 wherein the block diagram model includes at least one block identifying a set of related chemical reactions that are part of the biological process.

11. (Original) The method of claim 8 where step (a) further comprises:

(i) providing a graphical user interface for accepting user commands and data;

(ii) receiving, via the provided graphical user interface, user commands and data; and

(iii) constructing, using the received user commands and data, a model of the biological process.

12. (Original) The method of claim 8 wherein step (b) comprises generating, using the constructed model of the biological process, dynamic behavior of the modeled biological process using a stochastic computational model.

13. (Original) The method of claim 8 wherein step (b) comprises generating, using the constructed model of the biological process, dynamic behavior of the modeled biological process using a discrete time-based computational model.

14. (Original) The method of claim 8 wherein step (b) comprises generating, using the constructed model of the biological process, and dynamic behavior of the modeled biological process using a continuous time-based computational model.

15. (Currently Amended) An article of manufacture having embodied thereon computer-readable program means for integrated modeling[[,]] and simulation ~~and analysis~~ of biological processes, the article of manufacture comprising:

computer-readable program means for constructing a model of a biological process,  
wherein said model is manipulable by programming language instructions;

computer-readable program means for generating, using the constructed model of the biological process, an expected output of the modeled biological process; and

computer-readable program means for displaying the dynamic behavior.

16. (Original) The article of manufacture of claim 15 wherein said computer-readable program means for constructing a model of the biological process comprises computer-readable program means for constructing a block diagram model of a biological process.

17. (Original) The article of manufacture of claim 16 wherein said computer-readable program means for constructing a block diagram model of the biological process includes computer-readable program means for constructing at least one block identifying a set of related chemical reactions.

18. (Currently Amended) The article of manufacture of claim 15 wherein computer-readable program means for generating a[[n]] dynamic behavior of the modeled biological process comprises computer-readable program means for generating an expected result of the modeled biological process using a stochastic computational model.

19. (Currently Amended) The article of manufacture of claim 15 wherein computer-readable program means for generating a[[n]] dynamic behavior of the modeled biological process comprises computer-readable program means for generating an expected result of the modeled biological process using an event-based computational model.

20. (Currently Amended) A method for integrated modeling[[,.]] and simulation and analysis of a biological process comprising a plurality of chemical reactions, the method comprising the steps of:

(a) constructing a model of a biochemical process in a modeling component, wherein said model is manipulable by programming language instructions;

(b) analyzing the constructed model of the biological process to generate a result; and

(c) transmitting the result to the modeling component.

21. (Original) The method of claim 20 wherein step (b) comprises analyzing the constructed model of the biological process using bifurcation analysis.
22. (Original) The method of claim 20 wherein step (b) comprises analyzing the constructed model of the biological process using sensitivity analysis.
23. (Original) The method of claim 20 where step (b) comprises analyzing the constructed model of the biological process using parameter estimation.
24. (Original) The method of claim 20 wherein step (b) comprises analyzing the constructed model of the biological process using a non-linear solver.
25. (Original) The method of claim 20 wherein step (b) comprises analyzing the constructed model of the biological process using flux-balance analysis.
26. (Currently Amended) A system for integrated modeling[[,]] and simulation ~~and analysis~~ of a chemical reaction comprising:
- a modeling component for constructing a model of the chemical reaction, said model being manipulable by programming language instructions; and
- a simulation engine in communication with said modeling component, said simulation engine accepting as input the constructed model of the chemical reaction and generating an expected output based on the model; ~~and~~
- ~~an analysis environment in communication with said simulation engine and with said modeling component, said analysis environment performs analysis and displays the expected output.~~
27. (Original) The system of claim 26 wherein the modeling component comprises an environment for construction of a block diagram model of a chemical reaction.
28. (Original) The system of claim 27 wherein the modeling component further includes at least one block identifying a set of related chemical reactions.
29. (Original) The system of claim 26 wherein the modeling component accepts user commands and input for constructing the model of the chemical reaction.

30. (Original) The system of claim 26 wherein said simulation engine generates the expected output using a stochastic computational model.

31. (Original) The system of claim 26 wherein said simulation engine generates the expected output using a discrete time-based computational model.

32. (Original) The system of claim 26 wherein said simulation engine generates the expected output using a continuous time-based computational model.

33. (Currently Amended) A method for integrated modeling[[,]] and simulation ~~and analysis~~ of chemical reactions, the method comprising the steps of:

(a) constructing a model of a chemical reaction, wherein said model is manipulable by programming language instructions;

(b) generating, using the constructed model of the chemical reaction, an expected output of the modeled chemical reaction; and

(c) displaying the expected output on a display device.

34. (Original) The method of claim 33 wherein step (a) comprises constructing a block diagram model of a chemical reaction.

35. (Original) The method of claim 34 wherein the block diagram model includes at least one block identifying a set of related chemical reactions.

36. (Original) The method of claim 33 wherein step (a) comprises:

(i) providing a graphical user interface for accepting user commands and data;

(ii) receiving, via the provided user interface, user commands and data; and

(iii) constructing, using the received user commands and data, a model of the chemical reaction.

37. (Original) The method of claim 33 wherein step (b) comprises generating, using the constructed model of the chemical reaction, an expected output of the modeled chemical reaction using a stochastic computational model.

38. (Original) The method of claim 33 wherein step (b) comprises generating, using the constructed model of the chemical reaction, an expected output of the modeled chemical reaction using a discrete time-based computational model.

39. (Original) The method of claim 33 wherein step (b) comprises generating, using the constructed model of the chemical reaction, an expected output of the modeled chemical reaction using a continuous time-based computational model.

40. (Currently Amended) An article of manufacture having embodied thereon computer-readable program means for integrated modeling[[,]] and simulation ~~and analysis~~ of chemical reactions, the article of manufacture comprising:

computer-readable program means for constructing a model of a chemical reaction, wherein said model is manipulable by programming language instructions;

computer-readable program means for generating, using the constructed model of the chemical reaction, an expected output of the modeled chemical reaction; and

computer-readable program means for displaying the expected output.

41. (Original) The article of manufacture of claim 40 wherein said computer-readable program means for constructing a model of the chemical reaction comprises computer-readable program means for constructing a block diagram model of a chemical reaction.

42. (Original) The article of manufacture of claim 41 wherein said computer-readable program means for constructing a block diagram model of the chemical reaction includes computer-readable program means for constructing at least one block identifying a set of related chemical reactions.

43. (Original) The article of manufacture of claim 40 wherein computer-readable program means for generating an expected result of the modeled chemical reaction comprises computer-readable program means for generating an expected result of the modeled chemical reaction using a stochastic computational model.

44. (Original) The article of manufacture of claim 40 wherein computer-readable program means for generating an expected result of the modeled chemical reaction comprises computer-readable program means for generating an expected result of the modeled chemical reaction using an event-based computational model.

45. (Currently Amended) A method for integrated modeling[[,]] and simulation ~~and analysis~~ of chemical reactions, the method comprising the steps of:

- (a) constructing a model of a chemical reaction, wherein said model is manipulable by programming language instructions;
- (b) analyzing the constructed model of the chemical reaction to generate a result; and
- (c) transmitting the result to the modeling environment.

46. (Original) The method of claim 45 wherein step (b) comprises analyzing the constructed model of the chemical reaction using bifurcation analysis.

47. (Original) The method of claim 45 wherein step (b) comprises analyzing the constructed model of the chemical reaction using sensitivity analysis:

48. (Original) The method of claim 45 wherein step (b) comprises analyzing the constructed model of the chemical reaction using parameter estimation.

49. (Original) The method of claim 45 wherein step (b) comprises analyzing the constructed model of the chemical reaction using a non-linear solver.

50. (Original) The method of claim 45 wherein step (b) comprises analyzing the constructed model of the chemical reaction using flux-balance analysis.

51. (Original) The method of claim 45 wherein step (b) comprises generating, using the constructed model of the chemical reaction, an expected result of the modeled chemical reaction using a continuous time-based computational model.

52. (New) The method of claim 8 further comprising the step of annotating the model to add user-provided annotations.

53. (New) The method of claim 8 wherein step (a) comprises automatically connecting elements of the model using an auto-connection tool.
54. (New) The method of claim 8 further comprising the step of providing a tabular view of the model and a graphical view of the model to the user.
55. (New) The method of claim 9 wherein step (a) comprises constructing the block diagram to include a virtual block that is provided for graphical convenience but that plays no role in the semantics of the model.
56. (New) The method of claim 8 further comprising the step of generating a report regarding the model.
57. (New) The method of claim 8 further comprising the step of generating code for executing the model.
58. (New) The method of claim 57 further comprising the step of distributing the code for distributed execution.
59. (New) The method of claim 8 further comprising the step of creating a library from a portion of the model for reuse in another model.
60. (New) The method of claim 8 wherein step (a) comprises using a knowledge base of chemical reactions in constructing the model.
61. (New) The method of claim 8 wherein step (a) comprises enabling a user to specify a rapidity of at least one of chemical reactions of the biological process.
62. (New) The method of claim 8 wherein the step (a) comprises programmatically determining a graphical display that represents the model.
63. (New) The method of claim 8 wherein step (a) comprises constructing a conditionally executed sub-section that is executed upon satisfaction of a condition.
64. (New) The system of claim 26 further comprising an annotation tool for enabling a user to add annotations to the model.



65. (New) The system of claim 26 further comprising an auto-connection tool for automatically connecting elements of the model.
66. (New) The system of claim 26 further comprising a graphical view of the model and a tabular view of the model that are viewable by user.
67. (New) The system of claim 27 wherein the block diagram model contains a virtual block that is provided for graphical convenience but plays no role in semantics of the model.
68. (New) The system of claim 1 further comprising a report generator for generating reports regarding the model.
69. (New) The system of claim 1 further comprising a code generator for generating code for executing the model.
70. (New) The system of claim 1 further comprising a library containing at least one element saved from a previous model for reuse in the model.
71. (New) The system of claim 1 further comprising a formatting tool for enabling a user to customize multiple graphical attributes of the model.
72. (New) The system of claim 1 further comprising a knowledge base of chemical reactions that may be used by the modeling component.
73. (New) The system of claim 72 wherein the modeling component uses the knowledge base in construction of the model.
74. (New) The system of claim 1 wherein the modeling component enables a user to specify a rapidity of at least one of the chemical reactions.
75. (New) The system of claim 1 wherein the modeling component determines a graphical display for the model.
76. (New) The system of claim 1 wherein the modeling component constructs a model having a conditionally executed sub-section that is executed upon a condition being satisfied.
77. (New) The article of manufacture of claim 40 further comprising computer-readable program means for annotating the model to add user-provided annotations.

78. (New) The article of manufacture of claim 40 further comprising computer-readable program means for automatically connecting elements of the model.

79. (New) The article of manufacture of claim 40 further comprising computer-readable program means for providing a tabular view of the model and a graphical view of the model.

80. (New) The article of manufacture of claim 41 wherein said computer-readable program means for constructing a block diagram model of the chemical reaction includes computer-readable program means for constructing at least one block identifying a set of related chemical reactions.

81. (New) The article of manufacture of claim 41 wherein the computer-readable program means for constructing the model of the chemical reactions constructs the block diagram to include a virtual block that is provided for graphical convenience but plays no role in semantics of the model.

82. (New) The article of manufacture of claim 40 further comprising computer-readable program means for generating code for executing the model.

83. (New) The article of manufacture of claim 79 further comprising computer-readable program means for distributing the code that is generated for distributed execution.

84. (New) The article of manufacture of claim 40 wherein the computer-readable program means for constructing the model of the chemical reactions uses a knowledge base of chemical reactions to construct the model.

85. (New) The article of manufacture of claim 40 wherein the computer-readable program means for constructing the model of the chemical reactions enables a user to specify a rapidity of at least one of the chemical reactions.

86. (New) The article of manufacture of claim 40 wherein the computer-readable program means for constructing the model of the chemical reactions determines a graphical display for representing the model.

87. (New) The article of manufacture of claim 40 wherein the computer-readable program means for constructing the model of the chemical reactions constructs the model to include a conditional sub-section that executed upon satisfaction of a condition.